

DOCUMENT RESUME

ED 187 260

HE 012 734

AUTHOR Ellis, Richard
TITLE Simulation of Behavioral Variations in the Submission of Student Financial Statements: Effects on BEOG Costs. Stage I Draft Final Report for the Study of Program Management Procedures in the Campus-Based and Basic Grant Programs. (Volume IV).
INSTITUTION Applied Management Sciences, Inc., Silver Spring, Md.
SPONS AGENCY Office of Education (DHEW), Washington, D.C. Office of Evaluation and Dissemination.
PUB DATE 28 Feb 79
CONTRACT 300-77-0498
NOTE 29p.; For related documents see HE 012 682; HE 012 733-738. Not available in paper copy due to marginal legibility of original document.
EDRS PRICE MF01 Plus Postage. PC Not Available from EDRS.
DESCRIPTORS Access to Education; Cheating; *College Students; Dependents; *Eligibility; *Federal Programs; *Financial Aid Applicants; Financial Needs; Income; *Need Analysis (Student Financial Aid); Parent Financial Contribution; Program Administration; Records (Forms); Self Supporting Students; *Student Financial Aid
IDENTIFIERS *Basic Educational Opportunity Grants

ABSTRACT

Volume IV of a study of program management procedures in the campus-based and Basic Educational Opportunity Grant (BEOG) programs deals with a set of simulated modifications in the statements made by BEOG applicants about their financial circumstances. Various kinds of misrepresentation of income, assets, and other factors are postulated, and the effects of these statements on the BEOG program are estimated, using a computer-based model originally developed by HEW to provide forward estimates of program costs for Congress. Chapter discussions include an introduction, the baseline that establishes a relevant and consistent reference point for comparative purposes, and the simulations of variations in applicants' financial statements. The concluding chapter reports some of the findings: as many as 25 percent of applicants misreport income by understating it by \$250 or more; students tend to understate actual income because many work for cash and are not required to file an income tax return; and evidence supports the continuing efforts of the U.S. Office of Education to validate income statements for the program. Tables include the effects of distortions and overstatement in areas such as student income, family assets, dependent students' contributions, unusual expenses, number of dependents, and number of siblings enrolled in colleges. (LC)

* Reproductions supplied by EDRS are the best that can be made *
* from the original document. *

SIMULATION OF BEHAVIORAL VARIATIONS
IN THE SUBMISSION OF STUDENT FINANCIAL STATEMENTS:
EFFECTS ON BEOG COSTS

STAGE I DRAFT FINAL REPORT FOR THE
STUDY OF PROGRAM MANAGEMENT PROCEDURES
IN THE CAMPUS-BASED AND BASIC GRANT PROGRAMS

(Volume IV)

This report is made pursuant to Contract No. OE 300-77-0498. The amount charged to the Department of Health, Education, and Welfare for the work resulting in this report (inclusive of the amounts so charged for any prior reports submitted under this contract) is \$518,079.00. The names of the persons employed or retained by the contractor, with managerial or professional responsibility for such work, or for the content of the report, are as follows:

Dr. Robert T. Deane, Project Director
Mr. Michael J. Puma, Technical Manager
Mr. Richard A. Ellis, Technical Manager
Mr. Alan J. Cohen, Technical Manager

Applied Management Sciences, Inc.
962 Wayne Avenue, Suite 701
Silver Spring, Maryland 20910

U.S. DEPARTMENT OF HEALTH,
EDUCATION & WELFARE
NATIONAL INSTITUTE OF
EDUCATION

THIS DOCUMENT HAS BEEN REPRODUCED EXACTLY AS RECEIVED FROM THE PERSON OR ORGANIZATION ORIGINATING IT. POINTS OF VIEW OR OPINIONS STATED DO NOT NECESSARILY REPRESENT OFFICIAL NATIONAL INSTITUTE OF EDUCATION POSITION OR POLICY.

DEPARTMENT OF HEALTH, EDUCATION, AND WELFARE
Office of Education
Office of Planning, Budgeting, and Evaluation
Room 4087, FOB #6
400 Maryland Avenue, S.W.
Washington, D.C. 20202

February 23, 1979

ED187260

HE 012 734

ACKNOWLEDGEMENTS

Applied Management Sciences wishes to express its appreciation to Dr. Alexander Ratnofsky of the Office of Planning, Budgeting, and Evaluation, U.S. Office of Education, for his inputs and help in the preparation of this submission. Richard Ellis is the author of our report. Michael Consiglio and Roger McClung provided useful counsel on the construction and use of the BEOG cost Projection Model. Alan Cohen supervised all data processing. Overall direction of this portion of the Study of Program Management Procedures in the Campus-Based and Basic Grant Programs was provided by Dr. Robert T. Deane, Project Director, and Michael J. Puma, Project Coordinator.

SUMMARY

This report deals with a set of simulated modifications in the statements made by BEOG applicants about their financial circumstances. Various kinds of misrepresentations of income, assets, and other factors are postulated, and the effects of these statements on the BEOG program are estimated, using a computer-based model originally developed by DHEW to provide forward estimates of program costs for the Congress.

Detailed results of these simulations are presented in the main text of the report. The implications of each type of misrepresentation tested can be gauged by their effects on total costs of the BEOG program. Under the conventions adopted here, baseline BEOG costs for the 1979-80 academic year would entail \$3.201 billion in payments to students. The effect of the various distortions tested in this analysis is to add additional expense to this estimate, as follows:

- If every applicant understates family income by \$100: \$36 million;
- If every applicant understates family income by \$200: \$74 million;
- If every applicant reports only 99 percent of actual family income: \$47 million;
- If every applicant reports only 95 percent of actual family income: \$241 million;
- If every applicant reports only 90 percent of actual family income: \$493 million;
- If every applicant understates family assets by \$1000: \$34 million;
- If every applicant reports only 99 percent of actual family assets: \$6 million;
- If every applicant reports only 95 percent of actual family assets: \$36 million;
- If every applicant reports only 90 percent of actual family assets: \$78 million;
- If net contributions from dependent students are reduced by a constant \$100: \$105 million;

- If dependent students reduce their own actual resources for contributing to the cost of their education by \$500: \$175 million;
- If dependent students represent their own savings as zero: \$310 million;
- If all those claiming unusual expenses overstate them by \$100: \$2 million;
- If all those claiming unusual expenses overstate them by \$200: \$3 million;
- If approximately half of all applicants claim an additional dependent: \$199 million;
- If virtually all applicants claim an additional dependent: \$399 million;
- If the proportion of those claiming offsets due to the presence of other family members in post-secondary school rises from roughly 40 percent to roughly 50 percent: \$152 million; and
- If the proportion of those claiming these offsets rises to 60 percent: \$302 million.

For the purposes of comparisons, the impact of deliberate modification of the BEOG program to allow special treatment of farm and business assets has contributed \$58 million of the total baseline costs. It is evident that misrepresentation of applicant data can easily exceed this sum in impact on the Basic Grant program. This is strong evidence in support of existing efforts to validate the accuracy of these submissions.

On the basis of these results, misrepresentation of family income seems to be the most serious potential problem for the BEOG program, followed by understatement of dependent students' contributions. Exaggeration of the number of dependents or of the number of family members also going to school is also potentially large in effects on BEOG costs, but here there is less reason to actually expect applicants to engage in misrepresentation to the extent of the simulations. Understatement of family assets is a less serious matter, and exaggeration of unusual expenses does not appear to be likely to produce major effects on BEOG costs.

The discussion also notes that misrepresentations such as those simulated in this report are as much matters of equity as they are issues of sheer expense, since actual disbursements will be limited by ceilings imposed by the Congress. The effect of distortions is to shift the distribution of BEOG funds in the direction of those who have misrepresented their situations. In the most significant (highest-cost) cases, these shifts are especially likely to benefit the higher-income applicant.

TABLE OF CONTENTS

<u>Chapter</u>		<u>Page</u>
1	INTRODUCTION	1.1
2	THE BASELINE	2.1
3	SIMULATIONS OF VARIATIONS IN APPLICANTS' FINANCIAL STATEMENTS	3.1
	Initial Tests of Underestimates in Income	3.1
	Further Tests of the Effect of Income Understatements	3.3
	Effects of Understatement of Assets	3.3
	Effects of Understatement of Dependent Students' Contributions	3.5
	Effects of Overstatement of Unusual Expenses	3.7
	Effects of Overstatement of the Number of Dependents	3.7
	Effects of Overstatement on the Number of Additional Family Members Enrolled in Postsecondary Schools	3.12
4	CONCLUDING DISCUSSION	4.1

LIST OF TABLES

<u>Table</u>		<u>Page</u>
1	Effects of Distortions of Student Income State- ments on Total BEOG Costs: Baseline; Income Less \$100; Income Less \$200	3.2
2	Effects of Distortions of Student Income State- ments on Total BEOG Costs: Proportionate Under- estimates at .99, .95, and .90 of Income	3.4
3	Effects of Distortions of Student Statements of Family Assets	3.6
4	Effects of Distortions of Dependent Students' Contributions	3.8
5	Effects of Overstatement of Unusual Expenses . . .	3.9
6	Effects of Overstatement of the Number of Dependents	3.11
7	Effects of Overstatement of the Number of Siblings Enrolled in Colleges	3.13

1

INTRODUCTION

The Basic Educational Opportunity Grant (BEOG) Program entitles eligible post-secondary students to direct federal financial aid, "providing assistance according to a uniform scale of financial need."^{1/} Maximal grants are sizable enough to underwrite a substantial share of a student's cost of education, less an expected family contribution. The entitlement extends only to the limits of available funds appropriated by the Congress; if demand exceeds these limits, grants are prorated. The basic administrative instrument used to implement the BEOG program is the student's application, which includes detailed data on dependency status (whether or not a student is self-supporting), family finances, and possible special circumstances that may justify extra assistance.

It is obvious that the validity of the data submitted by BEOG applicants is crucial to the workability of the program. What is at stake is not just the overall cost to taxpayers of supporting higher education in the United States, but the equity of the process of disbursing funds to students. Times of economic distress create formidable pressures on people to misrepresent their need for BEOG assistance. To the extent that these pressures lead to actual distortions of an applicant's circumstances, the effect will be to increase the probability that funding limits will be reached, and to change the pattern of distribution of Basic Grants in the direction

^{1/} Annual Report of the Commissioner of Education (Washington, D.C. USGPO, 1978), p. 59.

of those who qualify by means of misrepresenting their situations. Strict oversight is, therefore, in the immediate interest of all those who elect to play this game by its rules.

The objective of this portion of the Study of Program Management Procedures in the Campus-Based and Basic Grant Programs is to explore the sensitivity of the BEOG system to a number of possible kinds of distortions of applicants' situations. To carry out this objective, a computer-based model used to provide forward estimates of BEOG costs for the Congress has been employed to simulate such problems as:

- Understatement of the income available to applicants and their families;
- Understatement of additional financial assets;
- Understatement of the specific contributions made by dependent students from their own earnings and savings;
- Overstatement of unusual expenses, such as medical bills, that qualify an applicant for extra consideration;
- Overstatement of the number of dependents in the applicant's family, which affects the determination of the disposable income available for an applicant's education; and
- Overstatement of the number of other family members also enrolled in programs of postsecondary education, which also enters into the determination of need.

Detailed descriptions of the computer-based BEOG Cost Projection Model, originally developed by the Office of Education, are available elsewhere.^{1/} For present purposes, it will suffice to note that the program works by dividing the population of postsecondary students into over 1,000 income, cost of education, and type of enrollment categories. Within each of these cells, the value of a BEOG grant is computed for the average student in the group, weighted by the size of that group, and accumulated to produce the ultimate statistics for the population as a whole. Thus the model does not work on

^{1/} "Report of the Cost Estimation Procedures Technical Work Group," DHEW/OE Memorandum of October 25, 1977, from Joseph A. Vignone to Ernst Becker, plus subsequent Technical Updates. See also Roger McClung, "Structure and Computations of the BEOG Cost Projection," unpublished draft technical paper, available from Applied Management Sciences (1978).

individuals directly, but on a group level, and this fact leads to certain complications for the simulations. These are noted as they arise in the discussions below.

2

THE BASELINE

To establish a relevant and consistent baseline for comparative purposes, and to test certain adjustments (see below) in the model that were required for the simulation, an initial run of the BEOG cost projection model was made using specifications matched to a recent run generated independently by USOE staff. This baseline estimate is for the 1979-80 academic year and assumes that the maximum Basic Grant is \$1,800, with full funding of the program by the Congress. Income is assessed at 10.5 percent, and rates of eligible students' participation in the BEOG program are set at 87.5 percent.

The adjustments in the cost projection model, referred to above, were required because the Office of Education wished to explore the effects of a constant dollar underestimate of income and asset figures--in effect, a simulation of the impact on costs if, for example, applicants were to consistently chop off a round hundred dollars from their actual incomes. Since the computer program calculates 1979-80 income and assets (as well as several other parameters) by applying an inflator to the original 1976-77 income data used in the projection model, these inflators have to be bypassed if one is to simulate a constant dollar distortion of figures for the projected year. To handle this, a new set of BEOG projection data was developed as follows:

- the inflated income, asset, tax, and other figures for 1979-80 were taken from USOE's own prior run, and substituted for the original, uninflated 1976-77 data normally used by the program; then
- the inflators for these figures were adjusted to 1.0.

The model was then run. Results were identical, in the aggregate, to those obtained in the Office of Education's own previous test. However, close inspection of the detailed results for particular subgroups revealed occasional small variations in outcomes between the two passes of the program, at the level of the fourth (or greater) significant digit. Variations at this level are insufficient to produce any change in projections of total BEOG program cost. They appear to be produced by rounding errors introduced by the income-inflating calculations that are performed in a normal run of the model.^{1/}

^{1/} A different problem was uncovered during the course of the simulation runs. In the permanent data array included in the program for the calculation of offsets for dependent students with siblings enrolled in programs of postsecondary education, an apparent typographical error in the original Data Element Fact Sheet (No. 13, revised 9/21/77; see Vignone memorandum, *op. cit.*) leads to the elimination of one percent of the students in the seventh income group from further consideration in the operations of the model. The percentages given to allocate these people into groups without the offset, with an offset for the presence of two students in school, and with an offset for three or more students, total 99.0 rather than the full 100.0 percent. Without access to the source data it is impossible to know which one of the three classes should be allocated the missing one percent of these individuals. To test the effects of this error, the largest of the categories, those without the offset, was increased from 52.1 to 53.1 percent. The effect was to raise total program costs by two million dollars--not an inconsiderable amount, but given overall scale of the BEOG program, not terribly problematic either. Note that this is the most conservative possible estimate of the error's impact; if either of the groups eligible for the offset is the one with the shortfall, then the missing students will have greater financial need and will receive additional BEOG support. The error run we have reported simply restores the missing cases to the model, without also applying the offset to those cases. It seems probable that this error has affected all runs of the BEOG cost projection model, and should be corrected by all users. A similar problem is also present in the program data for the matrix distributing family assets of independent students in the eighth income group (see Data Element Fact Sheet No. 14); however, here the effect is truly trivial, as the shortfall amounts to only 0.1 percent.

These adjustments in the cost projection model also permit a different type of test of behavioral variations and their effects on BEOG costs, as well as the constant dollar distortions originally proposed for review by USOE. On the modified model, proportionate under- or over-estimations of income and assets can also be easily assessed, by further adjustments of the inflators. For example, setting the inflator at 0.90 allows exploration of the effect of systematic underreporting of ten percent of income (which would not be a constant figure for all cases). Such an approach is utilized below in tests designed to locate thresholds where misrepresentations become matters of serious policy concern.

The test run resulted in an estimate of \$3.244 billion in total BEOG costs for 1979-80. This and other outcomes of the baseline run form the benchmark against which other results of the simulation are compared. The estimate includes \$26.9 million in allowances for program administration and \$16.1 million for institutional administration. When these constants are subtracted from the total, the remaining sum of \$3.201 billion represents the total BEOG program cost attributable to payments to students, the principal variable at stake in this discussion.

3

SIMULATIONS OF VARIATIONS IN APPLICANTS' FINANCIAL STATEMENTS

3.1 Initial Tests of Underestimates in Income

To perform this simulation, mean income figures for eight basic income classes utilized by the cost projection model were lowered by a uniform \$100 each. A second run was made using a \$200 underestimate, for comparative purposes. These adjustments are not precisely identical to the situation that would actually obtain if students were to distort their incomes by these amounts, because in that event taxes paid would also be lowered (although not by very much) and, in theory at least, the distribution of the population into the several income categories would also be affected--a change not easily emulated on the BEOG cost projection model. Neither of these problems seems major enough to seriously compromise the usefulness of the simulation.

The effect of the \$100 underestimate was to increase total BEOG costs by \$36 million. The impact of these increases is felt, in particular, at the extremes of the income distribution, because the lowest-income students experience the most direct advantage, while recipients that would not otherwise qualify for a Basic Grant are added to the highest-income class. Also, the results of the simulation suggest that independent students are more likely than most to benefit from this form of distortion. Outcomes are similar when the \$200 underestimate is examined, except that effects are roughly doubled, to \$74 million in extra costs. Table 1 on the following page provides additional details.

Table 1

EFFECTS OF DISTORTIONS OF STUDENT INCOME STATEMENTS ON TOTAL
BEOG COSTS: BASELINE; INCOME LESS \$100; INCOME LESS \$200

	Baseline	Income less \$100	Income less \$200
Net Cost in Billions	\$3.201	\$3.237	\$3.275
Distribution of Cost by Income Group (millions):			
Zero to \$5,372	\$490	\$502	\$514
\$5,373-\$10,072	842	848	855
\$10,073-\$16,116	880	887	894
\$16,117-\$20,145	490	495	498
\$20,146 or more	499	505	514
Number of Recipients (in thousands):	3,585	3,598	3,625
--by Income Group:			
Zero to \$5,372	459	457	457
\$5,373-\$10,072	731	734	736
\$10,073-\$16,116	857	860	870
\$16,117-\$20,145	606	608	609
\$20,146 or more	932	939	953
Average Award:	\$892	\$899	\$903
--by Income Group:			
Zero to \$5,372	\$1,066	\$1,097	\$1,126
\$5,373-\$10,072	1,150	1,155	1,162
\$10,073-\$16,116	1,027	1,031	1,028
\$16,117-\$20,145	808	814	817
\$20,146 or more	535	537	539
Distribution of Cost by Enrollment Series: ^{a/}			
Collegiate/Dep/FT	\$2,074	\$2,089	\$2,105
" / " /PT	128	129	130
" /Ind/FT	395	408	422
" / " /PT	68	70	72
All Social Security	310	312	314
Vo-Tech/Dep/FT	95	96	96
" / " /PT	9	9	9
" /Ind/FT	36	37	38
" / " /PT	4	4	4
Veterans/Dep/FT	30	30	31
" / " /PT	14	14	14
" /Ind/FT	24	25	26
" / " /PT	14	14	14

^{a/} In millions of dollars. Dep = dependent students; Ind = independent students; FT = full time; PT = part time.

3.2 Further Tests of the Effect of Income Understatements

Using the inflators in the computer program to create proportionate underestimates, as explained in section 2 above, three additional runs of the BEOG cost projection model were carried out to determine the implications of distortions of applicants' income to 99, 95, and 90 percent of the actual levels. The results, given in Table 2, confirm the conclusions reached for the constant-dollar distortions analyzed above: the students in the extreme income groups are especially likely to benefit from this kind of misstatement, particularly if they also claim independent status. As the amount of distortion becomes greater, the effects become very pronounced for the highest income groups. For example, if incomes are understated by as much as 10 percent, substantial increases result in both the amount of the average award and in the number of recipients for those at the upper end of the scale, contributing to a massive increase in program costs of nearly 500 million dollars. Even a 5 percent level of distortion has substantial effects (\$241 million). The 1 percent level falls between the two constant-dollar simulations reported above, at \$47 million in additional expenses. These figures provide some sense of the potential magnitude and seriousness of income misstatements; by way of comparison, purposive legislation to modify the treatment of farm and business assets in BEOG applications accounts for about \$58 million of the overall program costs projected for the 1979-80 baseline situation.

3.3 Effects of Understatement of Assets

Simulations of the impact of distortions of reported assets were carried out using procedures similar to those employed in the tests of applicants' income statements, above. Inflated 1979-80 asset figures in the modified BEOG cost projection program were reduced by a flat \$1,000 across the board (except for cases where the assets were under \$1,000 to begin with, in which case they were simply reduced to zero). In addition, separate runs of the model were conducted using the inflators to test effects of proportionate asset understatements at the 99, 95, and 90 percent levels.

Table 2

EFFECTS OF DISTORTIONS OF STUDENT INCOME STATEMENTS ON TOTAL
BEOG COSTS: PROPORTIONATE UNDERESTIMATES AT .99, .95, AND .90 OF INCOME

	Baseline	.99 of Income	.95 of Income	.90 of Income
Net Cost (Bill.)	\$3.201	\$3.248	\$3.442	\$3.694
Distribution by Income (mill.):				
Zero to \$5,372	\$490	\$497	\$506	\$521
\$5,373-\$10,072	842	844	864	887
\$10,073-\$16,116	880	890	929	979
\$16,117-\$20,145	490	497	534	576
\$20,146 or more	499	520	609	731
No. Recipients (thousands):	3,585	3,620	3,785	3,964
--by Incomes:				
Zero to \$5,372	459	460	458	468
\$5,373-\$10,072	731	731	738	745
\$10,073-\$16,116	857	862	897	920
\$16,117-\$20,145	606	608	621	630
\$20,146 or more	932	959	1,071	1,201
Average Award:	\$892	\$896	\$909	\$931
--by Incomes:				
Zero to \$5,372	\$1,066	\$1,080	\$1,104	\$1,113
\$5,373-\$10,072	1,150	1,154	1,170	1,189
\$10,073-\$16,116	1,027	1,032	1,036	1,064
\$16,117-\$20,145	808	816	859	914
\$20,146 or more	535	541	569	609
Dist. of Cost by Enrollment Group:				
College/Dep/FT ^{a/}	\$2,074	\$2,104	\$2,229	\$2,390
" / " /PT	128	130	136	144
" /Ind/FT	395	402	431	466
" / " /PT	68	69	76	84
Social Security	310	313	327	345
Vo-Tech/Dep/FT	95	96	102	110
" / " /PT	9	9	9	10
" /Ind/FT	36	37	39	42
" / " /PT	4	4	4	5
Veteran/Dep/FT	30	31	32	34
" / " /PT	14	14	14	15
" /Ind/FT	24	25	28	31
" / " /PT	14	14	15	18

^{a/} In millions. See Table 1 for abbreviations.

Under the rules of the BEOG program, financial assets--home equity, savings, etc.--are assessed at rates that are considerably more generous than those used to assess income. For this reason, one would expect the effects of underreported assets to be small in comparison to those found for income misstatements, and so they are. Table 3 shows that the impact of the constant \$1,000 underestimate of assets is a moderate one, resulting in \$34 million in extra program costs. The result is very close to that obtained for the 95 percent proportionate distortion of reported assets, although there are some variations in the distribution of additional BEOG costs among various types of students; as would be expected, a flat reduction is more beneficial to the lower-income recipient, while the proportionate reduction works to the advantage of the higher-income student.

The 99 percent adjustment of assets--equivalent to failure to report 1 percent of the actual figures--produces only minimal effects on BEOG costs, some six million dollars. The 90 percent adjustment, equivalent to a misstatement of 10 percent of assets, results in more substantial cost penalties of some \$78 million. The general conclusion is, then, that distortions of assets have to be very pronounced before they begin to have effects on BEOG costs equivalent to those experienced for underreported income.

3.4 Effects of Understatement of Dependent Students' Contributions

These simulations explore the impact of distortion of the contribution toward college costs from the use of student savings or other assets of the recipients themselves. These funds are assessed at 33.3 percent; in other words, one-third of student savings are assumed to apply toward the cost of education in any one year. The BEOG cost projection model utilizes a set of average net contributions, specific to each major income class, and ranging between \$201 and \$349 (as inflated for 1979-80). Three separate tests were conducted. In the first, the net contributions were simply lowered by a flat \$100 across the board. In the second, the net contributions

Table 3

EFFECTS OF DISTORTIONS OF STUDENT STATEMENTS OF FAMILY ASSETS

	Baseline	Assets less \$1000	Proportionate Understatements:		
			99%	95%	90%
Net Cost (billions)	\$3.201	\$3.235	\$3.207	\$3.237	\$3.279
Distribution, Cost by Income Group (mill.):					
Zero to \$5,372	\$490	\$498	\$497	\$492	\$495
\$5,373-\$10,072	842	851	840	845	846
\$10,073-\$16,116	880	886	879	887	895
\$16,117-\$20,145	490	495	491	498	508
\$20,146 or more	499	505	500	515	535
Number of Recipients (in thousands)	3,585	3,628	3,597	3,640	3,693
--by Income Group:					
Zero to \$5,372	459	464	460	459	462
\$5,373-\$10,072	731	736	730	735	735
\$10,073-\$16,116	857	867	860	863	871
\$16,117-\$20,145	606	610	608	615	624
\$20,146 or more	932	951	939	968	1,001
Average Award:	\$892	\$891	\$891	\$888	\$888
--by Income Group:					
Zero to \$5,372	\$1,066	\$1,072	\$1,079	\$1,072	\$1,072
\$5,373-\$10,072	1,150	1,155	1,150	1,148	1,151
\$10,073-\$16,116	1,027	1,022	1,022	1,027	1,027
\$16,117-\$20,145	808	812	807	810	814
\$20,146 or more	535	531	533	531	534
Distribution, Cost by Enrollment Series: ^{a/}					
Collegiate/Dep/FT	\$2,074	\$2,086	\$2,079	\$2,100	\$2,134
" / " /PT	128	129	128	130	132
" /Ind/FT	395	408	395	396	397
" / " /PT	68	71	68	68	68
Social Security	310	312	311	314	318
Vo-Tech/Dep/FT	95	96	95	97	98
" / " /PT	9	9	9	9	9
" /Ind/FT	36	37	36	36	36
" / " /PT	4	4	4	4	4
Veterans/Dep/FT	30	30	30	31	31
" / " /PT	14	14	14	14	14
" /Ind/FT	24	25	24	24	24
" / " /PT	14	14	14	14	14

^{a/} In millions of dollars. See Table 1 for abbreviations.

were divided by .33 (to derive the original total student asset figures); \$500 was then deducted from these totals; then the lowered figures for student assets were multiplied by .33 to derive a new set of net contributions. This second test will be referred to as "total assets less \$500" and results in considerably reduced net contributions--between \$36 and \$184--compared to the first test. In the third simulation, student assets (and therefore contributions) were simply reduced to zero. Results are given in Table 4.

These contributions have a direct effect on the Basic Grant calculation, and their effects are pronounced even though the sums of money involved are not large at the individual level. Simply reducing the net contribution by \$100 adds over \$100 million to total program cost; if contributions are zero, over \$300 million is added. The reduction of \$500 in the students' overall reported savings adds \$175 million. The effects are especially powerful for students in the highest income groups, where many more recipients are added to the pool of those eligible for a BEOG. Independent students are unaffected by these simulations, of course.

3.5 Effects of Overstatement of Unusual Expenses

These runs of the cost projection model simulate the effects on overall BEOG costs of misstatements of "unusual expenses" (generally, medical or casualty losses) submitted by students. The model assumes that less than 10 percent of the students will claim these offsets, an assumption which has been retained for the simulations. To test the magnitude of impact of distortions, the amount of expenses claimed was increased, first by \$100, then by \$200. Results are given in Table 5. The impact of these kinds of variations in student financial statements is minimal; at worst (with the \$200 increase) they result in a three million dollar increase in BEOG program costs.

3.6 Effects of Overstatement of the Number of Dependents

Simulating this kind of behavioral variation on the BEOG cost projection model is a somewhat more complex exercise than those discussed above, because of the computer program's need to operate on

Table 4

EFFECTS OF DISTORTIONS OF DEPENDENT STUDENTS' CONTRIBUTIONS

	Baseline	Contribution less \$100	Assets less \$500	Students' Contribution is zero
Net Cost (billions)	\$3.201	\$3.306	\$3.376	\$3.511
Distribution of Cost by Income Group (mill.):				
Zero to \$5,372	\$490	\$493	\$500	\$495
\$5,373-\$10,072	842	846	847	850
\$10,073-\$16,116	880	902	915	930
\$16,117-\$20,145	490	516	530	555
\$20,146 or more	499	549	584	681
Number of Recipients (in thousands)	3,585	3,659	3,711	3,847
--by Income Group:				
Zero to \$5,372	459	461	464	462
\$5,373-\$10,072	731	732	731	731
\$10,073-\$16,116	857	860	861	862
\$16,117-\$20,145	606	615	616	619
\$20,146 or more	932	991	1,039	1,173
Average Award:	\$892	\$903	\$910	\$912
--by Income Group:				
Zero to \$5,372	\$1,066	\$1,068	\$1,077	\$1,072
\$5,373-\$10,072	1,150	1,156	1,159	1,162
\$10,073-\$16,116	1,027	1,049	1,062	1,079
\$16,117-\$20,145	808	839	860	895
\$20,146 or more	535	553	562	580
Distribution of Cost by Enrollment Series: ^{a/}				
Collegiate/Dep/FT	\$2,074	\$2,159	\$2,216	\$2,327
" / " /PT	128	133	136	141
" /Ind/FT	395	395	395	395
" / " /PT	68	68	68	68
All Social Security	310	320	326	337
Vo-Tech/Dep/FT	95	99	102	107
" / " /PT	9	9	9	10
" /Ind/FT	36	36	36	36
" / " /PT	4	4	4	4
Veterans/Dep/FT	30	31	32	33
" / " /PT	14	14	14	15
" /Ind/FT	24	24	24	24
" / " /PT	14	14	14	14

^{a/} In millions of dollars. See Table 1 for abbreviations.

Table 5

EFFECTS OF OVERSTATEMENT OF UNUSUAL EXPENSES

	Baseline	Expenses plus \$100	Expenses plus \$200
Net Cost (billions)	\$3.201	\$3.203	\$3.204
Distribution by Income Group (mill.):			
Zero to \$5,372	\$490	\$490	\$497
\$5,373-\$10,072	842	842	839
\$10,073-\$16,116	880	881	878
\$16,117-\$20,145	490	490	490
\$20,146 or more	499	500	500
No. of Recipients (in thousands)	3,585	3,586	3,586
--by Income:			
Zero to \$5,372	459	459	459
\$5,373-\$10,072	731	732	732
\$10,073-\$16,116	857	857	857
\$16,117-\$20,145	606	606	606
\$20,146 or more	932	932	932
Average Award:	\$892	\$893	\$893
--by Income:			
Zero to \$5,372	\$1,066	\$1,067	\$1,081
\$5,373-\$10,072	1,150	1,151	1,147
\$10,073-\$16,116	1,027	1,027	1,024
\$16,117-\$20,145	808	808	808
\$20,146 or more	535	536	536
Distribution, Cost by Enrollmt. Grp.: ^{a/}			
College/Dep/FT	\$2,074	\$2,075	\$2,075
" / " /PT	128	128	128
" /Ind/FT	395	396	397
" / " /PT	68	68	68
Social Security	310	310	310
Vo-Tech/Dep/FT	95	95	95
" / " /PT	9	9	9
" /Ind/FT	36	36	36
" / " /PT	4	4	4
Veteran/Dep/FT	30	30	30
" / " /PT	14	14	14
" /Ind/FT	24	24	24
" / " /PT	14	14	14

^{a/} In millions of dollars. See Table 1 for abbreviations.

a group rather than on an individual basis. The model works by apportioning the population of students into categories for those whose families contain 1, 2, 3 ... or 8 or more dependents. By definition, dependent students cannot come from one-dependent households. Specific family size allowances are stated in the model for each household size. To simulate distortion of student dependent reporting, it is necessary to adjust the percentages allocating the population into these various categories in the cost projection model.

Two approaches were used. In the first case, dependent students in the group from two-dependent households were "bumped up" into the three-dependent category, with remaining groups following the same procedure, until the final class of those from households with eight or more dependents was reached; the same approach was applied to independent students except that in this case the students in the one-dependent class were split equally between one-dependent and two-dependent households. This has the general effect of increasing the number of dependents claimed by one, for everyone in the population, save only a portion of independent students still living alone (were this cell completely empty, the simulation would refuse, in effect, to admit to the presence of single, independent students in higher education). In the second approach, only one-half of the students in each class of household size were "bumped up."

The effect of these changes is very substantial, as the family size allowances increase by an average of over \$1,400 for each additional dependent. If half the students claim an extra dependent, total BEOG costs rise by almost \$200 million; if all students do so, costs increase by almost \$400 million. Both the size of typical awards and the overall numbers of recipients show substantial increases. All income groups and all kinds of enrollees are affected, although rounding of the detailed results (see Table 6) obscures these effects for the smaller categories of enrollment types.

Table 6

EFFECTS OF OVERSTATEMENT OF THE NUMBER OF DEPENDENTS

	Baseline	Fifty Percent Claim an Extra Dependent:	All Students Claim an Extra Dependent:
Net Cost in Billions	\$3.201	\$3.400	\$3.600
Distribution of Cost by Income Group (millions):			
Zero to \$5,372	\$490	\$524	\$551
\$5,373-\$10,072	842	898	954
\$10,073-\$16,116	880	928	979
\$16,117-\$20,145	490	513	540
\$20,146 or more	499	537	576
Number of Recipients (in thousands):	3,585	3,737	3,889
--by Income Group:			
Zero to \$5,372	459	467	467
\$5,373-\$10,072	731	777	821
\$10,073-\$16,116	857	893	933
\$16,117-\$20,145	606	613	622
\$20,146 or more	932	987	1,046
Average Award:	\$892	\$909	\$925
--by Income Group:			
Zero to \$5,372	\$1,066	\$1,120	\$1,179
\$5,373-\$10,072	1,150	1,154	1,162
\$10,073-\$16,116	1,027	1,039	1,049
\$16,117-\$20,145	808	837	867
\$20,146 or more	535	544	550
Distribution of Cost by Enrollment Series: ^{a/}			
Collegiate/Dep/FT	\$2,074	\$2,153	\$2,233
" / " /PT	128	132	137
" /Ind/FT	395	464	532
" / " /PT	68	81	93
All Social Security	310	321	331
Vo-Tech/Dep/FT	95	99	103
" / " /PT	9	9	9
" /Ind/FT	36	42	49
" / " /PT	4	4	5
Veterans/Dep/FT	30	31	32
" / " /PT	14	14	14
" /Ind/FT	24	32	40
" / " /PT	14	18	22

^{a/} In millions of dollars. See Table 1 for abbreviations.

H. Effects of Overstatement on the Number of Additional Family Members Enrolled in Postsecondary Schools

The treatment of this type of potential distortion of BEOG applicants' situations is similar to that used for analysis of the number of dependents, above. The BEOG cost projection model utilizes program statistics to allocate the population of students into categories with no other family members also enrolled in a postsecondary program, with one such person enrolled, and with two or more other members enrolled. If other family members are going to school, the program allows the applicant an offset for the burden of educating more than one student at the same time. The offset halves the expected family contribution for those with two or more members enrolled, in addition to the applicant; the contribution is cut to 70 percent of its normal value if one additional person is enrolled. Independent students may qualify when multiple members of their own households attend school.

In the standard BEOG cost projection, roughly 40 percent of the college-going population is assumed to qualify for this type of offset. To simulate overstatements, two approaches were used, as with treatment of family size allowances. In the first case, the proportion of those assigned to the "two or more family members enrolled, in addition to the applicant" class was doubled; also, an increase of the same magnitude was applied to the group qualifying for the smaller offset allowed for those with a single additional family member in school. This has the effect of raising the overall proportion of those covered by these offsets to 60 percent of the population. The second simulation used a similar approach, except here the increase was held to half of the size of the group qualifying for the largest offset; in this event, about 50 percent of the population would receive these benefits. The results are shown in Table 7, and again they are substantial, particularly for the higher income classes. If 50 percent of the population receive these offsets, overall program costs increase by more than \$150 million; if 60 percent receive them, costs rise by more than \$300 million.

Table 7

EFFECTS OF OVERSTATEMENT OF THE NUMBER OF SIBLINGS ENROLLED IN COLLEGES

	Baseline-- 40% Claim Offset	50% Claim Offset	60% Claim Offset
Net Cost (bill.)	\$3.201	\$3.353	\$3.503
Distribution by Income (millions):			
Zero to \$5,372	\$490	\$496	\$494
\$5,373-\$10,072	842	842	844
\$10,073-\$16,116	880	895	914
\$16,117-\$20,145	490	516	547
\$20,146 or more	499	604	704
No. Recipients (thousands):	3,585	3,766	3,942
--by Income:			
Zero to \$5,372	459	463	461
\$5,373-\$10,072	731	731	733
\$10,073-\$16,116	857	866	875
\$16,117-\$20,145	606	614	623
\$20,146 or more	932	1,092	1,250
Average Award:	\$892	\$890	\$888
--by Income:			
Zero to \$5,372	\$1,066	\$1,071	\$1,070
\$5,373-\$10,072	1,150	1,151	1,151
\$10,073-\$16,116	1,027	1,033	1,044
\$16,117-\$20,145	808	841	877
\$20,146 or more	535	552	563
Distribution, Cost by Enrollment: ^{a/}			
College/Dep/FT	\$2,074	\$2,195	\$2,314
" / " /PT	128	134	140
" /Ind/FT	395	397	400
" / " /PT	68	69	69
Social Security	310	323	337
Vo-Tech/Dep/FT	95	101	106
" / " /PT	9	9	10
" /Ind/FT	36	36	36
" / " /PT	4	4	4
Veterans/Dep/FT	30	32	33
" / " /PT	14	14	15
" /Ind/FT	24	25	25
" / " /PT	14	14	14

^{a/} In millions of dollars. See Table 1 for abbreviations.

4

CONCLUDING DISCUSSION

Of all of these analyses, the simulation of distortions in reported income levels remains the one with the most practical significance for the BEOG program, both because its effects are substantial and because it seems to be a realistic reflection of actual potential behavior. It is not difficult to conceive of underreporting of income on sufficiently massive a scale to be equivalent to the kinds of situations reported above. Validation studies have reported that as many as 25 percent of applicants misreport income by understating it by \$250 or more. It is difficult to translate this type of report into a simulation model, since "\$250 or more" covers a great deal of potential territory, and it may well be the case that substantial portions of the remaining 75 percent of the students also understate income by lesser amounts. On the whole, it seems very possible that these problems may entail very serious consequences for BEOG program costs, such as those derived above. This is powerful evidence in support of USOE's continuing efforts to validate income statements for the program.

The effects of understatements of dependent students' savings are also quite substantial. Again, it is not difficult to conceive of large numbers of students hedging their reports of their own assets, especially since these reflect forward estimates in many cases (of expected summer earnings), and because many students may work for cash pay or may not be required to file an income tax return.

The effects of overstating the numbers of dependents or family members enrolled in programs of postsecondary education are also potentially great. However, here the realism of the simulation may be less convincing. It seems unlikely that all students would misrepresent family sizes; it seems improbable that as many as half would do so. It also seems unlikely that the proportion of those claiming offsets for multiple student enrollments would rise to the extent of the simulations. In both of these cases, the intent was more to gauge the consequences of distortions on total program costs than to offer up a realistic description of known behavioral tendencies of students. In this sense, the outcome of the simulations is fairly clear: when these kinds of variations do occur, the outcomes will have major effects on BEOG Student Eligibility Indices. The actual extent of such practices remains a matter for speculation.

The simulations show that distortion of claims of unusual expenses are probably not likely to have much effect on BEOG costs. To be sure, the proportion of those claiming such expenses might rise--a possibility not treated in the analyses reported above. The present rate of claims of such costs is low enough, however, that exaggeration of these expenses would not have pronounced effects on the program. To a lesser extent, distortion of assets also appears to be a more tolerable type of problem; the assessment rates are low enough, in combination with the use of asset reserves, that even substantial understatements across the board would not have the kind of consequences for the program that are experienced with income and student savings.